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Case Report

Ecthyma: a potential mimicker of zoonotic infections in a returning traveler

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SUMMARY

The cutaneous ulcer in a patient with a history of international travel poses a vexing diagnostic dilemma for the clinician. While Streptococcus and Staphylococcus are common causes of cutaneous ecthyma, the necrotizing ulcer can have a vast differential diagnosis including ulcerating zoonoses.

1. Introduction

Streptococcus pyogenes (β-hemolytic group A Streptococcus, or GAS) is a common human pathogen causing 1.78 million new infections per year. Cutaneous GAS infection has diverse clinical manifestations. In patients with a relevant exposure or travel history, streptococcal infection can mimic potentially serious zoonotic infections. We present a case of streptococcal ecthyma in a returning traveler that remarkably resembled cutaneous anthrax, and highlight characteristic features of key ulcerating infections in this at-risk population.

2. Case report

A 66-year-old man returning from Southeast Asia was hospitalized for a 7-day history of tender papules and necrotic ulcers on the chest and extremities. History revealed arthropod assault, close contact with farm animals, including rabbits, and significant exposure to ceremonial water.

On review of systems, he reported fever, lethargy, arthralgias, and decreased appetite. His past medical history included hyperlipidemia, prostate cancer, and hypercoagulability syndrome. On examination, he was afebrile with a mild tachycardia. Cutaneous findings were significant for a crusted polymorphous eruption of papules, vesicles, and erosions distributed on the chest and upper extremities, hemorrhagic ulcers on the left wrist and foot, and multiple eschars on the lower extremities (Figure 1A). The ulcers were tender with a 'punched-out' appearance, characterized by well-demarcated elevated grey borders (Figure 1B). Surrounding erythema with an edematous leading edge was additionally noted of an eschar on the left wrist. Two 4-mm punch biopsies were obtained for hematoxylin and eosin and for tissue culture.

Laboratory evaluation revealed mild leukocytosis. A chest radiograph was negative for consolidation. Blood cultures were negative. Based on his exposure history, broad-spectrum antibiotics were initiated to cover a differential diagnosis that included tropical zoonotic infections.

Histopathological findings were consistent with an arthropod reaction with ulceration and impetiginization. Bacterial culture from the tissue biopsy and a chest wall vesicle were positive for 'innumerable' *Streptococcus pyogenes*, leading to a final diagnosis of ecthyma. Antibiotic coverage was narrowed to cefalexin upon discharge, with subsequent resolution on follow-up examination.

3. Differential diagnosis of ulcerating infections

3.1. Ecthyma

Ecthyma is a cutaneous infection by *Streptococcus pyogenes* or *Staphylococcus aureus* with dermal extension. Secondary infections

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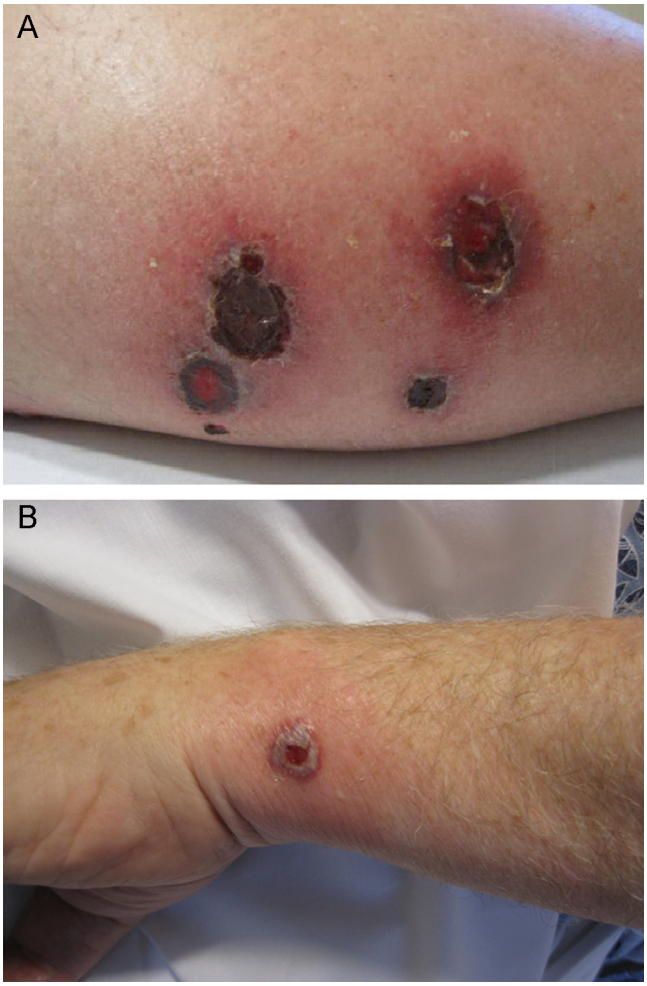

Figure 1. Streptococcal ecthyma presenting as necrotic ulcers in a returning traveler. (A) Multiple necrotic ulcers on the lower extremity. (B) A well-demarcated punched-out ulcer with elevated borders on the left wrist.

often follow trauma or arthropod bite. Ecthyma begins as vesiculopustules with a grey–yellow crust that evolves into shallow punched-out ulcers with a necrotic base and hemorrhagic crust. Lesions can be multiple and are commonly seen on the lower extremities. Risk factors include poor hygiene, malnutrition, and a tropical climate. Topical antibiotics are sufficient for limited disease, while oral antibiotics are required for more extensive involvement.[1]

3.2. Ecthyma gangrenosum

Ecthyma gangrenosum refers to a cutaneous manifestation of *Pseudomonas aeruginosa* bacteremia. It is most commonly seen in immunocompromised patients, particularly with neutropenia. Lesions begin as tender vesicles or pustules that hemorrhage before ulcerating into a necrotic eschar with an erythematous halo. Favored sites are the buttocks and extremities. Intravenous anti-pseudomonal antibiotics are necessary for treatment.[1]

3.3. Cutaneous anthrax

Bacillus anthracis is a Gram-positive bacillus best known for its potential use as a bioterrorist agent. Naturally occurring anthrax infects 2000 people worldwide annually, with cutaneous infection responsible for 95% of cases while inhalational and gastrointestinal disease account for the remainder. Transmission of cutaneous anthrax occurs through contact with spores in contaminated soil, infected farm animals, or their animal products.[2]

Cutaneous anthrax begins as a painless or pruritic papule that progresses into an eschar on a massively edematous background. Commonly involved sites include the head, neck, and upper extremities. Fever, lymphadenopathy, fatigue, hematological abnormalities, and abdominal pain can be present. Renal failure, disseminated intravascular coagulation, and septic shock are rare complications.

The diagnosis is confirmed by cultures, immunohistochemistry, or real-time PCR. Although 80% of cutaneous anthrax is self-limited, the mortality of untreated disease can approach 20%, due to systemic dissemination. Treatment recommendations are further discussed in the **Supplementary Material** (Table S1). Prompt initiation of antibiotics reduces mortality to less than 1%.[2]

3.4. Tularemia

Tularemia is a highly virulent disease caused by the Gram-negative *Francisella tularensis*. It is transmitted via arthropod vectors to rodents and lagomorphs, their host reservoirs. Human disease is acquired from tick or deerfly bites or handling infected animals and their products. Less commonly, tularemia can be transmitted through ingestion or inhalation.

Ulceroglandular tularemia (70–80% of cases) represents a papular localized infection that develops into a pustule or indurated punched-out inflammatory ulcer. Fever and lymphadenopathy are often present.[2]

Antibody serologies are available for diagnostic testing. Cultures are rarely undertaken due to the virulence and slow growth rate of *F. tularensis*. Without treatment (**Supplementary Material**, Table S1), overall mortality for non-respiratory or non-septicemic tularemia is 8%.[2]

3.5. Orf

Orf is a self-limiting cutaneous viral infection caused by a parapoxvirus that is spread by contact with infected animals such as goats and sheep. Lesions are most commonly seen on the hands or fingers. Transmission is facilitated by pre-existing skin trauma. Orf follows a distinctive clinical course characterized by six stages (**Supplementary Material**, Table S1), with resolution occurring over 6 to 12 weeks.[3] Because orf shares similar risk factors and clinical features to cutaneous anthrax and tularemia, confirmation by histology or real-time PCR is essential.[3]

3.6. Rickettsial disease

Tick-borne rickettsial infections have been documented worldwide. In Southeast Asia, far-eastern spotted fever, Japanese spotted fever, and Indian tick typhus, among others, are endemic.[4] Rickettsial diseases are generally characterized by an inoculation eschar followed by fever, headache, myalgias, lymphadenopathy, and a morbilliform or petechial eruption. Diagnosis is confirmed with serological testing, PCR, culture of the eschar, or skin biopsy. Severe rickettsial infections can lead to death, with some mortality rates reaching 40%. Early empiric treatment with doxycycline is therefore recommended.[4]

3.7. Buruli ulcer

Although endemic to Sub-Saharan Africa, buruli ulcer, caused by *Mycobacterium ulcerans*, has been reported in at least 33 countries worldwide, including parts of Southeast Asia.[5] Transmission is associated with significant water exposure. Commonly seen on the face and extremities, it begins as a painless

papule or nodule before ulcerating with a necrotic base, undermined borders, and local edema. Diagnosis is most reliable with PCR, although histology and culture are useful adjuncts. If left untreated, ulcers can lead to permanent deformities, joint contractures, and even death.[5]

4. Discussion

We present a case of secondary streptococcal ecthyma from an arthropod assault in a returning traveler to highlight an uncommon presentation of a common infection. Because the clinical appearance of the ulcers (Figure 1) was strikingly similar to cutaneous anthrax, diagnostic work-up to rule out zoonotic disease was undertaken.

Skin and soft tissue infections (SSTIs) are prevalent in international travelers. A survey of returning travelers revealed that SSTIs represent the most common cutaneous problem. Impetigo and abscesses comprised about 50% of cutaneous infections. Interestingly, ecthyma was diagnosed in 18% of patients. Ecthyma was significantly more likely to be associated with multiple lesions and a history of insect bite. Thirty-four percent of identified causative bacteria were GAS.[6]

In at-risk travelers, overlapping risk factors, exposures, and clinical presentations can make diagnosis of an infectious ulcer challenging. Appropriate history regarding immune status and environmental or animal exposures should be obtained. The distinguishing clinical features and treatment of such ulcerating infections are described in the **Supplementary Material** (Table S1). Identification of the offending pathogen is essential as some zoonotic infections can be fatal. Empiric antibiotic therapy is recommended while evaluation is in progress. Recognition of risk factors, exposures, and key clinical findings of necrotic ulcers in the traveling population can therefore direct initial management appropriately.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.ijid.2014.08.014.

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